

EXECUTIVE SUMMARY

INTRODUCTION

The Wastewater Master Plan provides a comprehensive review and evaluation of the City of Chula Vista's wastewater collection, conveyance, and treatment capacity requirements under existing and ultimate City buildout conditions. Based on findings of the evaluation, the Plan recommends facility improvements and financing alternatives to ensure that aging infrastructure remains serviceable and to allow for the continued buildout of the City's General Plan.

The City of Chula Vista is located in southwestern San Diego County, approximately seven miles north of the international border with Mexico. Incorporated in 1911, the City currently encompasses over 50 square miles. Chula Vista is one of the fastest growing communities in the State of California – the San Diego Association of Governments (SANDAG) projects that Chula Vista's population will increase from approximately 200,000 people today to nearly 300,000 by the year 2020.

The City provides sanitary sewer service for all areas within the City limits and owns, operates, and maintains approximately 430 miles of sewer main lines and 12 sewer pump stations. City collection facilities convey wastewater flows generated within eight drainage basins to connections to regional sewerage facilities located along San Diego Bay to the west and the Sweetwater River to the north. Flows are ultimately conveyed to transmission and treatment facilities operated by the City of San Diego's Metropolitan Wastewater Department (METRO).

The purpose of the Wastewater Master Plan is to evaluate system capacity, assess the condition of existing pump station facilities, develop a capital improvement plan (CIP) for rehabilitation and expansion of the collection system, and recommend a revised capacity charge. Specific recommendations are made for the repair, upgrading, and buildout of wastewater collection and pumping facilities. The 20-year CIP includes the recommended system improvements to address existing and projected capacity constraints as well as the acquisition of additional regional treatment capacity. This recommended CIP forms the basis for the updated capacity fee and capital facilities financing plan and will be used in sewer rate evaluations to be completed in separate financial studies.

STUDY AREA

The current population of the City is estimated to be 224,003 as determined by SANDAG. SANDAG forecasts the population of the City in year 2020 to be nearly 300,000 people, an increase of approximately 35 percent from the current census. For purposes of this study, existing land uses within the study area are categorized as single-family residential, multi-family residential, commercial, industrial, institutional, parks and vacant land. Table E-1 summarizes the existing land uses within the study area.

**Table E-1
City of Chula Vista Existing Land Use**

Land Use	Units ⁽¹⁾	
Single-family Residential	40,924	Dwelling Units
Multi-family Residential	4,025	Dwelling Units
Commercial	1,508	Acres
Industrial	733	Acres
Institutional	1,423	Acres
Park	1,896	Acres
Vacant / Open Space	18,649	Acres

⁽¹⁾ Based on City Parcel Database

The City of Chula Vista is a participating agency in the City of San Diego owned and operated METRO system. The system includes regional sewer interceptors and trunk sewers, pump stations, and treatment and disposal facilities. Currently, the City owns capacity rights of 19.843 million gallons per day (mgd) in the METRO system.

WASTEWATER GENERATION PROJECTIONS

SANDAG population projections were used to estimate future City wastewater flows. Growth projections for the City are shown in Figure E-1.

Based on SANDAG population projections, the estimated average City wastewater flow rate at buildout of the adopted General Plan is 23.322 mgd. Table E-2 provides estimated basin flow rates based on SANDAG growth projections.

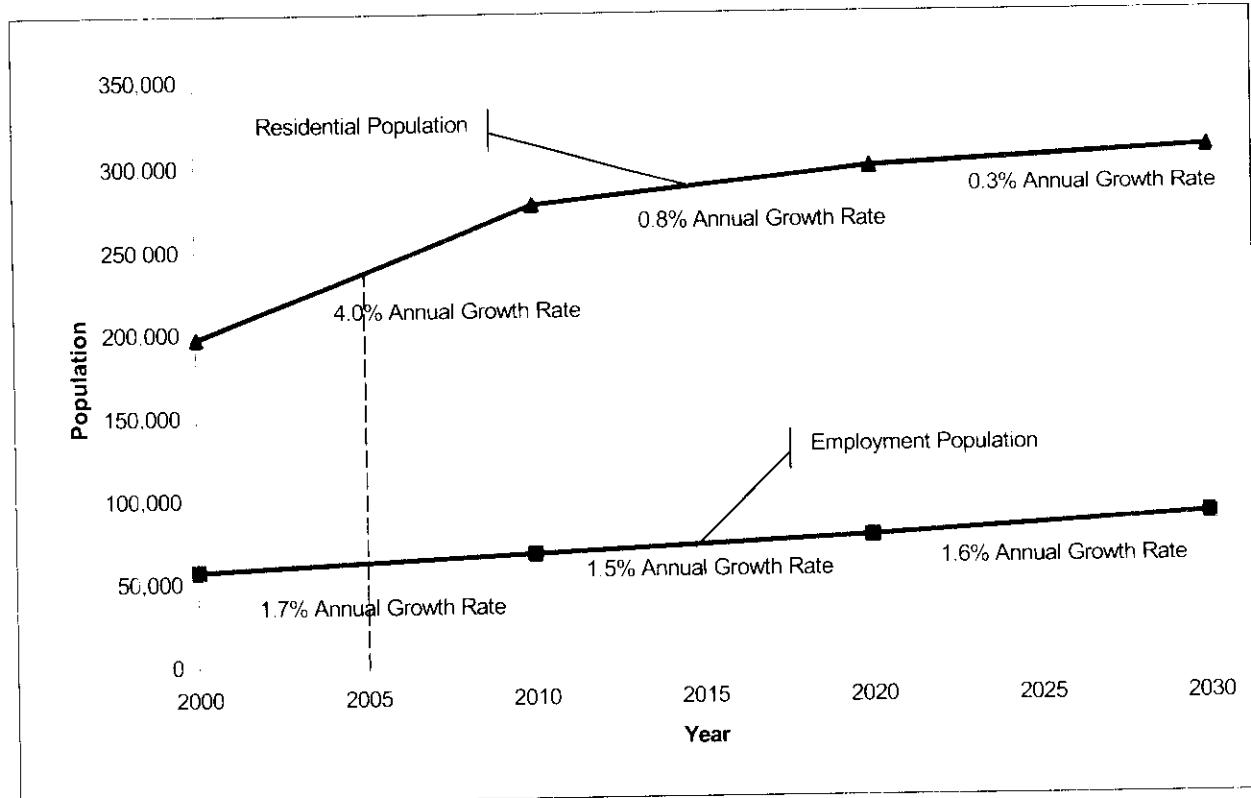


Figure E-1. SANDAG Population Growth Projections

Table E-2
Projected Wastewater Generation

Basin	Average Dry Weather Flow (mgd)			
	2000	2010	2020	2030
Bayfront	0.089	0.133	0.178	0.235
Date-Faivre	0.630	0.630	0.644	0.666
G Street	1.842	1.979	2.142	2.274
Main Street	3.159	3.840	3.957	4.054
Poggi Canyon	0.859	2.109	2.224	2.301
Salt Creek	0.375	2.512	3.512	3.710
Sweetwater	3.697	3.887	4.035	4.143
Telegraph Cyn	4.278	5.604	5.722	5.939
TOTAL	14.929	20.693	22.414	23.322

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METRO SYSTEM CAPACITY

The City currently has capacity rights in the METRO system (comprised of conveyance, treatment, and disposal facilities) equal to 19.843 mgd and will soon be allocated additional capacity through a re-rating process currently underway. Based on current projections, the City's existing METRO capacity rights will be exceeded by year 2009. Additional capacity due to the expected re-rating would defer this date to approximately 2011. Figure E-2 shows METRO capacity thresholds based on the future flow estimates given above as well as the projected build-out flows from the general plan update preferred alternative. A total of approximately 3.5 mgd of additional capacity will be required with the implementation of the adopted general plan and an additional 6.4 mgd of additional capacity for the proposed general plan update preferred alternative by year 2030.

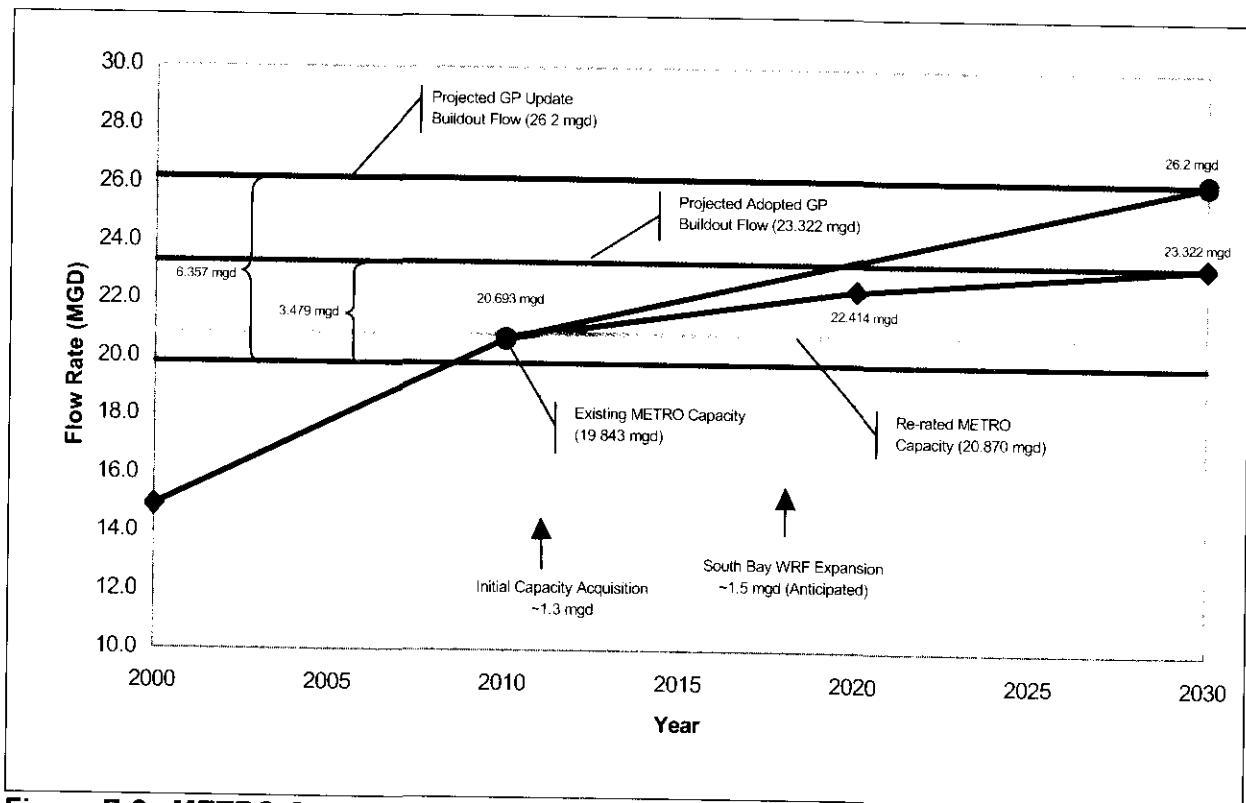


Figure E-2. METRO Capacity Threshold

WASTEWATER COLLECTION SYSTEM CAPACITY EVALUATION

An evaluation of the available capacity in the City's existing wastewater collection system was completed to identify sewer reaches that may be undersized to accommodate existing and/or future wastewater flows. Based on findings of the evaluation, phased facility improvements

were identified to reduce the potential for sanitary sewer overflows as well as to allow for projected growth within the City's service area.

The objectives of the sewer capacity evaluation included:

- Development of hydraulic models of the City's wastewater collection system (generally pipes 12-inch in diameter and larger)
- Identification of sewer reaches that may be overcapacity under existing and projected future peak wastewater loading conditions
- Recommend improvements to the existing collection system to reduce the potential for sanitary sewer overflows and to allow for planned growth within the City's service area

Detailed hydraulic models of the City's wastewater collection system were developed and used to simulate existing and buildout wet weather flow conditions in mains generally larger than 12-inch in diameter. The models were calibrated to meter data recorded over the Memorial Day holiday period in 2003 at both permanent meters maintained by the City of San Diego and at temporary meters placed in support of the Master Plan. City buildout assumed 100 percent development of existing vacant parcels in accordance with current zoning and land use designations.

Pipe reaches in which simulated wet-weather flows exceeded a flow depth to pipe diameter ratio of 0.85 were identified as potential improvement reaches. Improvements required to provide adequate capacity for projected flows were then determined through an iterative modeling process. When sizing pipes for ultimate conditions, the size of the replacement pipe was increased such that peak d/D ratios within the improved reach were less than 0.75 for pipes 12-inches and larger and 0.50 for pipes smaller than 12-inches.

Several reaches within the Telegraph Canyon and Main Street Sewer Basins were identified as over-capacity under both existing and ultimate basin buildout. No constrained reaches were identified within the other sewer basins. Table E-3 presents a summary of the recommended improvements. Prior to construction of improvements, it is recommended that the City conduct detailed engineering investigations of the identified reaches that may include field inspections, flow metering during peak flow periods (such as holidays) and under wet-weather conditions, and video inspection.

The capacity evaluation illustrated that the City has a very limited extent of capacity-constrained sewers within the collection system, a testament to judicious facility planning as the older trunk sewers located in the western portions of the City appear to generally be of sufficient diameter to convey projected flows from the extensive planned development in eastern Chula Vista. Newer mains located east of I-805, which typically have been installed through development fees, showed no capacity constraints through buildout of the City's General Plan.

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**Table E-3
Sewer Main Improvements**

Location	Approximate Replacement Length
Main Street Trunk Sewer Diversion (vicinity of Main and Fresno Streets) ⁽¹⁾	NA
Colorado Street (Between K and J Streets)	1,314 ft
Moss Street (Between Broadway and Woodlawn Avenue)	1,303 ft
Center Street (Between 4 th and Garrett Avenues)	630 ft
Total	3,247 ft

⁽¹⁾ Proposed diversion will mitigate all constrained reaches of Main Street Trunk Sewer, cost based on City conceptual study

GENERAL PLAN UPDATE CAPACITY EVALUATION

The City is currently updating the City-wide General Plan. The initial phase of the update, which is referred to as *Vision 2020*, identified boundaries of the update study areas and culminated with the development of four alternative land use plans for these areas. As part of the Master Plan, an evaluation of the general impacts of each alternative on the existing City wastewater collection system was completed. The evaluation included analysis of future hydraulic conditions in the City's existing collection system under buildout of each of the alternatives and a comparison of these analyses to the projected conditions under adopted General Plan buildout.

The City has developed four alternative land use plans for the General Plan Update. The alternatives include land use changes, which consist of either land use classification changes or density modifications or both, for the general planning areas. These areas have been designated in the General Plan Update as the Northwest, Southwest, and East.

The overall City-wide impacts from each of the alternative land use plans are minor from the standpoint that additional lineal footage of constrained sewer ranges from approximately 2,800 to 4,500 feet. If the City constructs a proposed diversion structure in the Main Street Trunk Sewer, the additional constrained reaches may be reduced by as much as approximately 2,000 feet. Additionally, the majority of the additional constrained reaches are extensions of proposed future improvements and could be constructed as part of these projects. Proposed land use changes in the eastern area would be served by 36-inch diameter and larger reaches of the Salt Creek Interceptor. These reaches have adequate capacity to convey the estimated additional flows from each of the land use alternatives.

Implementation of any of the alternatives will likely require acquisition of additional METRO capacity, which may result in considerable additional incremental costs to the City.

PUMP STATION CONDITION ASSESSMENT

An assessment of the city's permanent sewer pump stations was completed with the objective of identifying pump station deficiencies and recommended improvements, development of improvement cost estimates, and prioritization of the identified upgrades in a Sewer Pump Station Rehabilitation Plan integral to the Master Plan. Preliminary recommendations were presented and discussed in a meeting with the City on February 18, 2004. A two-phase Rehabilitation Plan was developed with City staff in which improvements were classified as immediate (Phase 1) or long-term (Phase 2). A summary of the recommended improvements is shown in Table E-4.

Table E-4
Recommended Pump Station Improvements

Sewer Pump Station	Recommended Improvements	Phase
Police Station Department (SPS-01)	New pump station with: Lined wet well Submersible pumps with guide rails Underground valve vault with hatch 6 hours of Emergency Storage Emergency Generator Electrical Controls Landscaping	1
G Street (SPS-02)	New pump station with: Dry well / Wet Well configuration Emergency Generator Positive ventilation of dry well Odor Control System 6 hours of Emergency Storage	1
Hill Top Drive (SPS-11)	New pump station with: Lined wet well Submersible pumps with guide rails Underground valve vault with hatch 12 hours of Emergency Storage Electrical Controls Portable Emergency Generator (shared) Landscaping	2
Woodcrest Terranova (SPS-12)	Wet well / Emergency Storage reconfiguration	2

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Sewer Pump Station	Recommended Improvements	Phase
Max Field (SPS-15)	Spare Pump Unit 12 hours of Emergency Storage New Electrical Panel Install aluminum hatch over wet well	2
Robinhood Ranch Unit II (SPS-24)	12 hours of Emergency Storage Grading and Drainage Improvements Landscaping	2
Robinhood Ranch Unit III (SPS-25)	New pump station with: Lined wet well Submersible pumps with guide rails Underground valve vault with hatch 12 hours of Emergency Storage Electrical Controls Portable Emergency Generator (shared)	2

SEWER SYSTEM DESIGN STANDARDS

Adopted sewer system design criteria are specified in the City's Subdivision Manual Section 3-300 (revised June 2001). Wastewater unit generation rates for use in design of sewer improvements are presented in Table E-5.

Table E-5
Recommended Sewer Design Unit Generation Rates

Land Use	Unit Generation Rate
Residential (R-1 and R-2)	265 gpd per dwelling unit
Residential (R-3 and MHP)	199 gpd per dwelling unit
Commercial/Industrial/Institutional	2,500 gpd per acre
Parks	500 gpd per acre
Elementary School	15 gpd per capita
Junior High and High School	20 gpd per capita

Table E-6 presents hydraulic sewer design criteria.

Table E-6
Hydraulic Sewer Design Criteria

Parameter	Criteria
Peak flow depth to pipe diameter ratio (d/D)	0.50 for $d \leq 12$ -inches 0.75 for $d > 12$ -inches
Manning 'n' factor	0.013 for VCP or RCP, $d \leq 21$ -inches 0.012 for VCP or RCP, $d > 21$ -inches 0.012 for PVC, all sizes
Minimum velocity	2 feet/second
Maximum velocity	12 feet/second

CAPITAL IMPROVEMENT PROGRAM

A wastewater system Capital Improvement Program (CIP) was developed based on the findings of the collection system capacity evaluation, pump station assessment, and pipeline rehabilitation and replacement analysis. The recommended CIP includes pipeline capacity improvements, pump station operational and capacity improvements, the implementation of a new Video Inspection Program, and several miscellaneous programs. Additionally, the CIP includes annual budgetary allowances for pipeline rehabilitation and replacement improvements. The CIP is presented in three phases – Phase 1: fiscal years 2004 – 2008, Phase 2: fiscal years 2009 – 2013, and Phase 3: fiscal years 2014-2023.

The objectives of the Capital Improvement Program included:

- Identification of annual budgetary estimates to construct facility improvements required to mitigate existing and projected capacity constraints
- Identification of annual budgetary estimates to construct improvements to existing pump stations to address facility condition, operational, capacity, and/or regulatory deficiencies
- Development of annual budgetary estimates for pipeline rehabilitation and replacement improvements
- Recommendation of a phased implementation schedule for facility improvements

A replacement and rehabilitation budget was developed through analysis of the age of the City's collection system. The goal of the age of pipe analysis was to provide a basis for allocating the necessary funds to repair or replace pipe segments that are in the worst condition and pose the highest risks of sewer spills. For this study, the useful life of pipe is assumed to be 80 years. Figure E-3 summarizes the age of the City's collection system.

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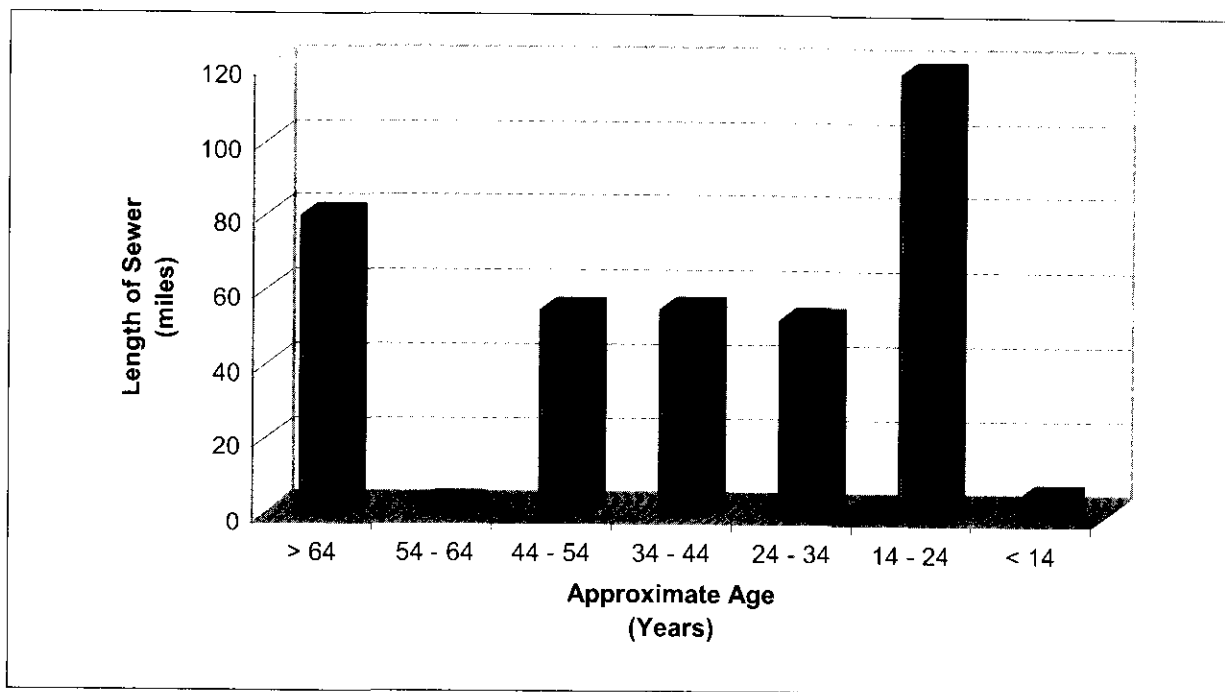


Figure E-3. Age of Sewer

Based on the age of pipe analysis and an assumed useful life of 80 years, the 20-year CIP includes estimated costs for replacement and rehabilitation of all pipes listed as constructed prior to 1940. Based on discussions with City staff, the CIP assumes replacement of 20% of these older pipes and rehabilitation of 80% of the pipes within the next 20 years.

The estimated 20-year cost for the replacement and rehabilitation program is approximately \$41 million. Annual budgets included in the CIP for the initial 10-year period are \$300,000 in year 1, \$500,000 in year 2, and approximately \$800,000 for the remaining years in Phase 1 and Phase 2. For reference, the City has historically allocated approximately \$300,000 per year for sewer rehabilitation and replacement projects.

A phased budget for recommended pump station improvements was developed based on priorities established with City staff input. The recommended improvements are included in Phases 1 and 2 of the CIP. Note that, based on the age of the existing pump stations, the City has historically not included major, programmed pump station improvements in the CIP, but rather has budgeted for annual routine maintenance costs.

Phase 1 (years 1 through 5) of the CIP comprises improvements to the Police Station Department SPS and G Street SPS. The capital cost of the Phase 1 improvements totals \$2,450,000. Phase 2 (years 6 through 10) comprises upgrades to the Hill Top Drive SPS, Woodcrest Terranova SPS, Max Field SPS and Robinhood Units II and III SPS. The total capital cost for Phase 2 amounts to \$1,170,000. Table E-7 presents the improvement budget for each pump station.

Table E-7
Pump Station Improvements CIP Budget Estimates

Pump Station	Improvement Budget
CIP Phase 1	
Police Station	\$350,000
G Street	\$2,100,000
<i>Phase 1 Subtotal</i>	<i>\$2,450,000</i>
CIP Phase 2	
Hill Top Drive	\$320,000
Woodcrest Terranova	\$190,000
Max Field	\$80,000
Robinhood Ranch Unit II	\$270,000
Robinhood Ranch Unit III	\$310,000
<i>Phase 2 Subtotal</i>	<i>\$1,170,000</i>
Total	\$3,620,000

Budgets for sewer capacity improvements are provided in Table E-8. Since the projects are required to relieve capacity constraints under existing loading conditions, all of the projects were included in the Phase 1 CIP. The cost of each project was distributed evenly over the 5-year CIP phase.

Table E-8
Sewer Main Improvements CIP Budget Estimates

Location	Approximate Replacement Length	Replacement Cost Estimate
Main Street Trunk Sewer Diversion (vicinity of Main and Fresno Streets) ⁽¹⁾	NA	\$63,000
Colorado Street (Between K and J Streets)	1,314 ft	\$283,000
Moss Street (Btwn Broadway and Woodlawn Avenue)	1,303 ft	\$262,000
Center Street (Between 4 th and Garrett Avenues)	630 ft	\$127,000
Total	3,247 ft	\$735,000

⁽¹⁾ Proposed diversion based on City conceptual studies and cost estimates

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CAPACITY FEE UPDATE AND FACILITIES FINANCING PLAN

Sewer capacity charges are one-time fees paid by new development at the time of connection to a given agency's sewer system, and they represent the estimated reasonable cost of providing system capacity to the new development. This report outlines proposed changes to the City of Chula Vista's capacity charge, known as the "sewer capacity charge" and the calculation methodology upon which the recommendations herein are based.

The recommended sewer capacity charge presented herein is not to exceed \$3,478 per EDU based on a "system buy-in" methodology, which establishes a value of the City's system capacity on the City's existing pipeline facilities as well as the existing treatment facilities operated by the City of San Diego in which the City of Chula Vista contractually owns capacity rights.

After considering the various methodologies and available information required for each methodology, this study is recommending that the City adopt the "system buy-in" methodology based on the City's sewer collection system assets as identified in a recently prepared GASB-34 study, as well as the existing sewage treatment facilities operated by the City of San Diego in which the City of Chula Vista contractually owns capacity rights.

Reasons that the system buy-in methodology is most applicable to the City include:

- Most capital projects identified in the recommended sewer capital improvement program are replacement and rehabilitation projects that will be required whether development occurs or not. Few of the projects have a direct or significant expansion purpose. Under the system buy-in approach, new development would buy into the existing sewer system.
- The buy-in methodology is much easier to administer, explain, and update relative to other methodologies. With respect to administrative requirements, as a reimbursement charge the City does not have to follow any specific accounting requirements for the expenditure of capacity charge revenue, though it is recommended that the funds be used to rehabilitate and upgrade the existing sewer systems.

The foundation of the system buy-in method is to create equity between existing and new users, such that the new users pay for the cost or value associated with the portion of existing system capacity that they use. The basic equation for calculating system buy-in capacity fees is:

$$\frac{\text{Value of existing asset (\$)}}{\text{Total flow (gallons)}} \times \text{gallons per EDU} = \$/\text{EDU capacity charge}$$

Table E-9 presents the calculated capacity charge based on the City's adopted flow per EDU of 265 gallons per day.

Table E-9
Proposed Capacity Charge based on System Buy-In Methodology

Assets	Cost (Present Value)	Average Flow⁽¹⁾ (mgd)	Cost per Unit Flow (\$/gpd)	Flow per EDU	Cost per EDU
METRO Facilities ⁽²⁾	\$1,874,042,515	198.392	9.45	265	\$2,503.23
Chula Vista Pipelines	\$72,996,399	19.843	3.68	265	\$974.85
		Total	13.12		\$3,478.09

⁽¹⁾ METRO flows are based on audited fiscal year 2003 flows. Chula Vista flows are based on existing pipeline capacity, which is assumed equal to the city's contractual capacity in the METRO system

⁽²⁾ Present value of METRO assets is based on ENR index, Dec 2003 = 7,531.77

Recommendations actions include:

1. Increase the current capacity fee from \$3,000 to an amount that does not exceed \$3,478 per EDU.
2. Evaluate the adjustment of the sewer replacement fees. Recommended adjustments include increasing the single-family replacement fee from \$0.70 to \$1.97 monthly and multi-family/non-residential from \$0.06 to \$0.11 per HCF. This adjustment will allow the City to fund their replacement CIP in an orderly manner on a pay-go basis.
3. Continue to review all options regarding the purchase of additional capacity for sewage treatment both within and possibly outside the METRO system.
4. Adjust capacity fees annually based on the annual change in the ENR-CCI-LA. A full review and update to the capacity fees should be performed every three to five years or in conjunction with any master plan update.

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